population, and demographic and risk characteristics (age, type of risk, etc.). Meta regression analysis has been widely applied in the health literature to pool results from clinical studies to examine how key factors influence health outcomes. In the economics literature, the approach has been used to examine determinants of willingness to pay for air quality improvement (Smith and Huang (1995) and Smith and Osborne (1996)) and determinants of VSL in hedonic wage studies (Mrozek and Taylor 2002).

Empirical Bayes meta-regression analysis uses a two stage hierarchical model to examine both within-study and between study variability. The first stage pooling completed by Kochi, Hubbell, and Kramer (2002) provides posterior estimates of VSL using information from all estimates in the literature. Additional work is necessary to provide further adjustment to the posterior estimates by specifying the VSL estimate as a function of study characteristics plus a between study variability term. The result of this analysis will be VSL distributions that are conditional on study characteristics. This will allow the analyst to calculate a VSL distribution that is appropriate to a given regulatory context. It will add to the growing literature on value of statistical life by systematically assessing that literature and shedding light on how study characteristics influence estimated VSL.

One specific issue highlighted by Kochi et al.is the finding that the stated preference VSLs are statistically different than the VSL estimates that are derived from the wage-risk studies. This raises the benefits transfer issues associated with this literature. In particular, are the wage-risk estimates (based on revealed preference) more reliable than the stated preference estimates for valuing these risk reductions. Or, are the stated preference estimates better for this benefits-transfer exercise?

**Applying the Newly Quantified Uncertainties**

With the results of the focused analyses described above in hand, we plan to use a similar approach to propagating and presenting uncertainties in benefits estimates associated with CAAA provisions as the approach we adopted for the first prospective analysis. For each of the three target years of the analysis (2000, 2010, and 2020) we will generate distributions of monetized annual estimates for the human health and welfare effects that incorporate both the quantified uncertainty associated with each of the health effect estimates and the quantified uncertainty associated with the corresponding economic valuation strategy. The resulting range of estimates for monetized benefits we present will be more narrow than would be expected with a complete accounting of the uncertainties in all analytical components.

In the first step of our procedure, we will employ statistical analysis to generate mean estimates and quantified uncertainty measures for each C-R function for each endpoint-pollutant combination. For the many health and welfare effects where only a single study is available to serve as the basis for the C-R function, we will use the reported estimate in the study as the best estimate of the mean of the distribution of C-R coefficients. We will characterize the uncertainty surrounding the estimate of the mean C-R coefficient by the standard error of the reported estimate. This yields a normal distribution, centered at the reported estimate of the mean. If multiple studies are considered for a given C-R function, we will derive a normal distribution for each study, centered at the mean estimate reported in the study (replaced in the case of PM-mortality by the results of the expert elicitation). On each iteration of the Monte Carlo aggregation procedure, a computer will select a C-R coefficient from an aggregate distribution of C-R estimates for that endpoint. The
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